



Natural variability versus human impact: Hydroclimate variability and the role of agriculture in changing dust emissions from Australia.

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Broad-scale dust emissions play an important role in Earth systems, for example influencing oceanic productivity via phytoplankton fertilisation. Existing palaeo dust records show that dust emissions vary significantly in time, implying its impact is similarly variable. There remains, however, a paucity of records which quantify variability in dust emissions. This study presents continuous, Holocene-aged, records of dust emissions from Australia, an important global dust source. Records demonstrate that rates of dust export have varied by 8-30 times over the mid to late Holocene. This variability is largely attributed to hydroclimate variability and its associated feedbacks within dust source areas. Significantly, however, a major disruption of dust emission rates is recorded in the past 200 years when dust emissions increased by between 2-10 times rates of natural variability in dust export. This change is concomitant with the arrival of Europeans in Australia and is primarily attributed to the development of agriculture which resulted in unprecedented environmental change in Australia's arid interior. This result broadly accords with the few other existing empirical dust records which both pre-date and post-date the onset of agriculture in various arid and semi-arid regions. Collectively, these records imply the impact of dust in Earth systems has changed as a result of agricultural development.